What is claimed is:

1. A bandpass sampling receiver for receiving RF signals, comprising:

a first ADC, for converting the RF signal into the first path of digital signal under the control of the first sampling clock signal;

a second ADC, for converting the RF signal into the second path of digital signal under the control of the second sampling clock signal;

a signal separating unit, for separating the in -phase signal and the quadrature signal in the first path of digital signal and the second path of digital signal;

wherein the frequency of said first sampling clock signal and said second sampling clock signal is 1/N of that of said RF signal, and N is a natural number.

2. The receiver of claim 1, wherein there exists a relative delay τ between said first sampling clock signal and said second sampling clock signal, and the relative delay τ meets the condition $\omega_c\tau \neq n\pi$, where ω_c is the circular frequency of said RF signal and n is a natural number.

3. The receiver of claim 2, further comprising:

a first lowpass filter, for receiving said first path of digital signal and outputting the first path of digitally filtered baseband digital signal to said signal separating unit;

a second lowpass filter, for receiving said second path of digital signal and outputting the second path of digitally filtered baseband digital signal to said signal separating unit.

4. The receiver of claim 3, wherein said signal separating unit includes:

an initial phase calculating unit, for calculating the initial phases of said RF signal respectively relative to said first sampling clock signal and said second sampling clock signal, according to the known signal sent from the transmitter;

an I/Q signal separating unit, for separating the in -phase signal and the quadrature signal in the first path of digital signal and the second path of

digital signal, according to the initial phases.

5. The receiver of claim 4, wherein said known signal can be one of the pilot signal and the midamble signal.

6. The receiver of claim 5, wherein said initial phase calculating unit calculates the initial phase with the following formula:

$$\varphi_1 = \arccos\left(\frac{S_{10}(t)}{\sqrt{I_0^2(t)+Q_0^2(t)}}\right) - \arctan\left(\frac{Q_0(t)}{I_0(t)}\right) \text{ and}$$

$$\varphi_2 = \arccos\left(\frac{S_{20}(t)}{\sqrt{I_0^2(t)+Q_0^2(t)}}\right) - \arctan\left(\frac{Q_0(t)}{I_0(t)}\right)$$

wherein:

φ_1 is the initial phase of said RF signal relative to said first sampling clock signal;

φ_2 is the initial phase of said RF signal relative to said second sampling clock signal;

$S_{10}(t)$ is the output signal after said known signal is filtered by said first lowpass filter;

$S_{20}(t)$ is the output signal after said known signal is filtered by said second lowpass filter;

$I_0(t)$ is the in-phase component of said known signal;

$Q_0(t)$ is the quadrature component of said known signal.

7. The receiver of claim 5, wherein said I/Q signal separating unit separates the in-phase signal and the quadrature signal in said first path of baseband digital signal and said second path of baseband digital signal:

$$I(t) = \frac{S_1(t)\sin(\varphi_2) - S_2(t)\sin(\varphi_1)}{\sin(\varphi_2 - \varphi_1)}$$

$$Q(t) = \frac{S_1(t)\cos(\varphi_2) - S_2(t)\cos(\varphi_1)}{\sin(\varphi_2 - \varphi_1)}$$

wherein:

$I(t)$ is said separated in-phase signal;

$Q(t)$ is said separated quadrature signal;

$S_1(t)$ is said first path of baseband digital signal;

$S_2(t)$ is said second path of baseband digital signal;

φ_1 is the initial phase of said RF signal relative to said first sampling clock signal;

φ_2 is the initial phase of said RF signal relative to said second sa mpling clock signal; and $\varphi_2 = \varphi_1 + \omega_c \tau$.

8. The receiver in any one of the foregoing claims, wherein said relative delay fulfills equation $w_c \tau = (2n \pm \frac{1}{2})\pi$, where ω_c is the circular frequency of said RF signal, τ is said relative delay and n is a natural number.

9. The receiver of claim 4, further comprising:

an initial phase judging unit, for judging whether said calculated initial phase fulfills equation $\varphi_1 = 2k\pi + \frac{n\pi}{2}, n = 0,1,2,3$, where φ_1 is the initial phase of said RF signal relative to s aid first sampling clock signal;

wherein said I/Q signal separating unit takes said first path of baseband digital signal and said second path of baseband digital signal respectively as the real part and the imaginary part of the complex signal if the initial phase fulfills the equation, then shifts the phase of the complex signal by $\frac{n\pi}{2}$ and takes the real part and the imaginary part of the obtained complex signal as said separated in -phase signal and quadrature signal.

10. A method for bandpass sampling the received signals, comprising:

(a) converting the RF signal into the first path of digital signal under the control of the first sampling clock signal;

(b) converting the RF signal into the second path of digital signal under the control of the second sampling clock signal;

(c) separating the in-phase signal and the quadrature signal in the first path of digital signal and the second path of digital signal;

wherein the frequencies of said first sampling clock signal and said

second sampling clock signal are 1/N of that of said RF signal and N is a natural number.

11. The method of claim 10, wherein there exists a relative delay τ between said first sampling clock signal and said second sampling signal, and the relative delay τ meets condition $\omega_c\tau \neq n\pi$, where ω_c is the circular frequency of said RF signal and n is a natural number.

12. The method of claim 11, further comprising:

filtering said first path of digital signal, and outputting the first path of baseband digital signal obtained after filtering;

filtering said second path of digital signal, and outputting the second path of baseband digital signal obtained after filtering;

wherein the in-phase signal and the quadrature signal in the first path of baseband digital signal and the second path of baseband digital signal are separated in step (c).

13. The method of claim 12, wherein step (c) includes:

calculating the initial phases of said RF signal relative to said first sampling clock signal and said second sampling clock signal, according to the known signal sent by the transmitter;

separating the in-phase signal and the quadrature signal in said first path of baseband digital signal and said second path of baseband digital signal, according to the initial phases.

14. The method of claim 13, wherein said known signal can be one of the pilot signal and the midamble signal.

15. The method of claim 14, wherein said initial phases are calculated with the following formula:

$$\varphi_1 = \arccos\left(\frac{S_{10}(t)}{\sqrt{I_0^2(t)+Q_0^2(t)}}\right) - \arctan\left(\frac{Q_0(t)}{I_0(t)}\right) \text{ and}$$

$$\varphi_2 = \arccos\left(\frac{S_{20}(t)}{\sqrt{I_0^2(t)+Q_0^2(t)}}\right) - \arctan\left(\frac{Q_0(t)}{I_0(t)}\right)$$

wherein:

φ_1 is the initial phase of said RF signal relative to said first sampling clock signal;

φ_2 is the initial phase of said RF signal relative to said second sampling clock signal;

$S_{10}(t)$ is the output signal of said known signal after filtered by said first lowpass filter;

$S_{20}(t)$ is the output signal of said known signal after filtered by said second lowpass filter;

$I_0(t)$ is the in-phase component of said known signal;

$Q_0(t)$ is the orthogonal component of said known signal.

16. The method of claim 14, wherein the in-phase signal and the quadrature signal in said first path of baseband digital signal and said second path of baseband digital signal are separated with the following formula:

$$I(t) = \frac{S_1(t)\sin(\varphi_2) - S_2(t)\sin(\varphi_1)}{\sin(\varphi_2 - \varphi_1)}$$

$$Q(t) = \frac{S_1(t)\cos(\varphi_2) - S_2(t)\cos(\varphi_1)}{\sin(\varphi_2 - \varphi_1)}$$

wherein:

$I(t)$ is said separated in-phase signal;

$Q(t)$ is said separated orthogonal signal;

$S_1(t)$ is said first path of baseband digital signal;

$S_2(t)$ is said second path of baseband digital signal;

φ_1 is the initial phase of said RF signal relative to said first sampling clock signal;

φ_2 is the initial phase of said RF signal relative to said second sampling clock signal; and $\varphi_2 = \varphi_1 + \omega_c \tau$.

17. The method of any one of claim 10 to 16, wherein said relative delay meets condition $w_c \tau = (2n \pm \frac{1}{2})\pi$, where ω_c is the angular frequency of said RF signal, τ is said relative delay and n is a natural number.

18. The method of claim 13, further comprising:

judging whether said calculated initial phase meets the condition $\varphi_1 = 2k\pi + \frac{n\pi}{2}, n = 0,1,2,3$, where φ_1 is the initial phase of said RF signal relative to said first sampling clock signal;

taking said first path of baseband digital signal and said second path of baseband digital signal respectively as the real part and the imaginary part of the compl ex signal if the initial phase meets the equation, then shifting the phase of the complex signal by $\frac{n\pi}{2}$ and taking the real part and the imaginary part of the obtained complex signal as said separated in -phase signal and quadrature sign al.